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ABSTRACT

Focusing on the Institute's role in environmental affairs, the challenges facing the Institute, and the importance of its current activities and programs as they relate to the environment, an Environmental Issues Seminar was conducted by the Institute of Agriculture, University of Minnesota on September 16-17, 1971. This publication contains the papers which were presented at the seminar, summary reports of group discussions, and a brief summary of the seminar itself. Major topics for comment and discussion were (1) creatively and realistically relating programs and resources to environmental problems and (2) environmental issues and conflicts generated by: our energy using technology, our socio-economic goals and priorities, and our production-consumption goals and processes. Group discussions centered on setting institutional goals and organizational guidelines for relating creatively, realistically, and effectively to problems of the environment. A list of participants is included. (BL)

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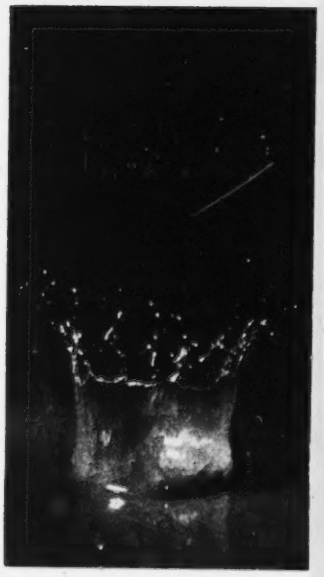
THE INSTITUTE AND THE ENVIRONMENT

AN AWARENESS SEMINAR



INSTITUTE OF AGRICULTURE UNIVERSITY OF MINNESOTA

September 16 and 17, 1971

SE 015 685

FOREWORD

On September 16 and 17, 1971, administrators and selected interested faculty members from the Institute of Agriculture participated in an Environmental Issues Seminar at Camp St. Croix, Hudson, Wisconsin.

The purpose of the seminar, was to:

Develop a better understanding of the environmental issues and conflicts which are being generated by our technology, our socio-economic goals and priorities, and our production-consumption goals and processes.

Discuss ways and means to creatively and realistically relate the programs and resources of the Institute of Agriculture to environmental problems.

Begin the process of developing some institutional goals and guidelines for the Institute of Agriculture relative to environmental issues.

This publication contains papers which were presented at the seminar, summary reports of the group discussions, and a brief summary of the seminar itself.

LaVern A. Freeh
Seminar Chairman

ADDITIONAL INFORMATION AVAILABLE

Information about the Institute of Agriculture's current involvement in environmental problems, through its research, extension and instructional programs, is available in a publication which was prepared for distribution to seminar participants prior to the seminar. Copies may be obtained from the Office of Special Programs, Institute of Agriculture, University of Minnesota.

The publication is entitled "The Institute and the Environment," September 16, 1971.

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Our Charge

Sherwood O. Berg, Dean
Institute of Agriculture

It is not necessary or useful for me to cite startling facts relating to the environmental crisis to attract the attention of a group like this. In fact, in driving to this meeting site this morning, we were greeted by a thin strip of grey, chilling smog, painted against the eastern sky and nestling forebodingly over the beautiful Saint Croix Valley. Was it an omen? What did it portend for this conference?

We have all been involved for many years in the problems which have gained so much publicity in recent months and years. But, we also recognize that our response to the needs of society must be sharper and better organized than ever. That's why we're here today.

There are two aspects of our public service as it relates to environmental problems. First of all, we must protect the quality of life and maintain the capacity of nature, so far as we control it, to sustain wholesome life. At the same time we must make an effort to improve quality of life and the capacity of our environment to enhance that quality. Agriculture has had outstanding success in the area of increased productivity, an essential ingredient in the abundance which we enjoy in this country. These overall goals are accomplished by helping people get the most out of their environment while doing the least damage. That is the task in the broadest perspective.

We must focus our efforts through the two avenues of education and research. By education we can promote a better understanding of how to use the environment and what the issues really are. We have an obligation to help provide the general public with the best possible opportunity for understanding. In this way we can influence the decisions of government policymakers. We can influence the policies of industrialists and members of the agribusiness and commercial communities. Of course, we are thoroughly familiar with our role to train scientists to analyze problems and contribute toward solutions.

While we are training and educating we also must be searching for new information and new ways of coping with problems through our research. There is, then, a third way in which a university can help solve environmental difficulties.

To do these things, however, calls for the development of the organizational mechanisms which will bring the University's expertise to bear upon specific problems which concern communities and individuals. It is the development of a response to "here and now" societal problems with a "total" institutional effort which should be one of our concerns. Is it possible that institutions, such as the Institute of Agriculture, have not developed the organizational and management tools as effectively, efficiently, and flexibly as they might?

Some of you were at the seminar at Hudson House on September 8 where we discussed the University's reaction and sensitivity to the needs of the public and the policies of the state legislature. The issues that were raised by those dicussions are extremely pertinent to the discussions which we will have today. I expect today's discussions will bear as much fruit. We must ask ourselves what the people expect of the University of Minnesota? What can the University of Minnesota do? The answer to this last question inevitably involves sorting out all of the colleges, departments, units, and groups within the University which are contributing environmental information or are capable of doing so.

The discussions at the administrative seminar left no question that most educators regard universities as an agency of public service and leadership. We have recognized that we have trained the technicians and done much of the research which has created a technology capable of generating pollution but also capable of preventing it. The decisions of the future which are made regarding the uses of our technology will, to some degree, depend upon the kind of education they have had.

All three colleges in the Institute of Agriculture are deeply involved in environmental issues. The College of Agriculture has been a partner in the creation of America's agricultural plenty. What were once problems of simply raising production have become more complex, and trade-offs have to be made. There is the problem with agricultural waste, agricultural chemicals, including pesticides, and the choices to be made between competing methods of insect control and production increases.

The College of Forestry has also helped to build an efficient and innovative industry, but also one, if not properly managed, which can damage the environment. The evolution of the College of Forestry curricula testified to the fact that forests are not merely collections of trees, but include space for man's recreation and aesthetic needs, and operate as an important part of the biosphere.

And, of course, no college could be more intimately involved with quality of life than the College of Home Economics, both from the point of view of the consumer and home manager and from the point of view of the vast commercial and industrial complex oriented toward home consumption. Probably the payoffs of good education and widespread information are greater in home decisions than in the more centralized management decision of industry and government.

In addition to our three colleges, all three of the programs of the Institute are involved with the improvement of the quality of life and preservation of the environment. Today we must look for answers to questions: How do these colleges and programs bring their concerns and their expertise together? What is the best use that we can make of the Environmental Quality Council and the Extension Environmental Task Force?

We must ask what are the specific problems that we need to tackle immediately? What is going on right now? What about our present position in other areas? What are to be our priorities? We must define criteria; and those criteria should emerge from today's discussions. We must talk about how we can refine our mechanisms for coordination in the Institute and with agencies outside the Institute. These are some of the thoughts which I hope will be in all our minds as we interact in the program today.

Creatively and Realistically Relating Programs and Resources to Environmental Problems– A Framework

Raymond D. Vlasin,
Chairman, Department of Resource Development,
Michigan State University

I. Introductory Comments
   A. Objectives of my presentation:
      1. Provide a framework for thinking about environment, environmental problems and work you might undertake. This is the primary objective.
      2. Suggest some approaches or examples you might seriously consider in relating programs and resources to environmental problems.
      3. Serve as a resource to you. I will rely on discussions after the presentation and later to provide opportunities for specific examples and details concerning individual problems and programs.
      4. Draw upon my recent experiences in helping to design and operate the University of Wisconsin-Green Bay, a university focusing upon environmental problems and opportunities.
   B. Reason for focus of my presentation:
      1. Throughout my presentation, major emphasis will be upon providing a framework. Hopefully, Dr. Schein and Dr. Geyer will be able to use it in their presentations. Also, it may serve as a basis for subsequent discussions and actions by this group.
      2. Important that we have a common framework of concepts within which we can communicate in this important but difficult area.
      3. A framework will give us some common reference points upon which we can build.

II. Framework for Approaching Our Environmental Discussions
   A. Environment–How you view it is crucial to your selection of problems and programs:
      1. How you view the term "environment" (or environments) can make a major difference in what you define as a priority problem, decide to do, and how you go about doing it.
      2. "Environment" can be defined very narrowly or it can be defined broadly. Please recognize that there are distinctly different ways to define or view environment.
      3. There are, in fact, many "different environments," and these are reflected in the literature on environmental problems and programs. Let us turn first to the different ways of viewing environment– whether narrowly or broadly.
   B. Different ways of viewing environment:
      1. Many view environment as largely pertaining to the various natural resources and natural resource situations. They focus upon water, soil, air, forests, flora and fauna, sunlight and other energy sources, and they also focus upon such resource situations and attributes as scenic vistas, open spaces, wilderness areas and natural places for various recreation uses. The identification, inventory, monitoring, use, abuse, development, management, protection and restoration of these resources and resource situations occupy the lion's share of our environmental literature.
      2. More and more attention is being given to the manmade resource situation or the manmade physical environment. Included are the metropolitan areas and other urban places, the highways, airports and other transit and transport facilities, the utilities, and the various residential, commercial and industrial facilities. Also included are the schools, hospitals, playgrounds and parks, and other public and private buildings and facilities. We build and use these manmade components of our environment daily. They constitute an important part of our total environment and are intimately interrelated with the natural resource situations.
      3. There is still a broader view of "environment." This view holds that the environment is comprised of important physical and biological resource situations (both natural and man made) but that it is also comprised of important economic, social, cultural, and aesthetic dimensions as well. This view recognizes the impact of man on his physical, biological, economic, social, cultural and aesthetic environment, and the impact of that environment back on man.
      4. This broader view recognizes that environmental problems are pan-disciplinary in nature (cut across the various disciplines) and that the solutions are pan-disciplinary in character. Viewing the problems from our academic departments we see these problems as multi-disciplinary in their analyses and solution (require several disciplines to be properly conceptualized, analyzed and improved or remedied). I am emphasizing the multi-disciplinary nature here because it has major implications for the manner in which you organize and carry out your professional work on environmental problems.
      5. Further, I have found this broad view of the environment and environmental problems to be both functional and meaningful for environmental education and action. A new institution I helped to build, the University of Wisconsin-Green Bay, has designed its entire academic plan, including instruction, applied analysis, and community outreach around this broad conception of the environment. (This type of organization does not obviate the need for high quality professional personnel with major strength in some disciplinary field. It does, however, place an added burden on the unit to obtain personnel who can readily relate their disciplinary skills and competencies to those of other disciplines in a problem setting.)

C. There are many different environments or subsets of the total environment:
   1. We recognize that all components of the biosphere are interrelated and interconnected into one fantastically complex environment. However, for analytical purposes and for purposes of education and environmental action we can and must also consider meaningful subsets of this total environment.
   2. The meaningful subsets can be categorized in many different ways:
      a. By type of resource situation—e.g., watershed, airshed, forest, wilderness area, swamp, bog, inland lake, river basin, city, factory, schoolroom, home for elderly, trailer camp, etc.
      b. By type of creature, plant, animal, or human involved and its life support systems, including services and controls—e.g., ecology of root-infecting fungi in soil, ecology of red pine, ecology and behavior of woodcock, big-game habitat requirements, differences in preschool home environments and their impact on the child's development, elderly person's responses to different elderly home environments, etc.
      c. By environmental function—e.g., living-working environment, recreation-leisure environment, technological environment, etc.
      d. By levels of human aggregation—household, neighborhood, community, multi-community, region, multi-region, etc.
   3. An important caution is to realize that whatever subset or situation you choose is one of convenience. In reality, that subset or situation relates to a larger environment. Further, that subset relates directly or indirectly to man.
   4. You should be especially sensitive to the possible impact the environmental situation can have on man and the possible impacts that man can have on it.

D. Observation concerning environmental problems directly relevant to University efforts:
   1. There is a tremendous gap between science and the citizen. The scientific knowledge concerning environmental problems and possible solutions is very substantial, while the understanding of these by citizens is very limited.
   2. There is a lack of understanding by citizens concerning how individual actions as consumers and producers combine with those of others to cause environmental impacts.
   3. Many, many public and private officials who directly affect the environment by their actions have very limited understanding of the interrelated nature of different segments of the environment. Even those who do understand the interrelated nature of things may be grossly handicapped in their decision-making by lack of relevant information.
   4. There is excessive characterization of pollution and environmental quality issues as "good vs. bad," or as "development is bad and no development is good." In short, pollution and quality issues are painted as "black and white." There has been a serious neglect by many environmentalists and others to portray these quality issues in terms of gradations of quality possible only at different levels of cost.
   5. I find a monumental lack of understanding of the need for multiple-feasibilities to insure success in environmental improvement ventures. Many scientists, as well as citizens, do not recognize that for an environmental improvement effort to succeed it must be physically and biologically possible, economically feasible, socially and politically acceptable, and legally and administratively possible. Many who have joined the environmental movement or who have become "instant ecologists" have been negligent or uninformed in this regard.
   6. Values and attitudes of leaders and citizens are very important. I have observed that values and attitudes of those involved in decisions and those affected by decisions are crucial to environmental improvement actions. The significance of human values and attitudes should not be overlooked in the problem identification phase or in the analysis of possible remedial measures.
   7. In analyses of environmental problems and design of remedial measures one must be sensitive to both direct and indirect effects. One might characterize this as a concern for primary, secondary, and tertiary effects, or first order, second order, and third order effects. So often in our research efforts in the past we have been content to evaluate only the immediate, direct effects of a new technique, product, or action. We have been less concerned or even unconcerned about the likely secondary or tertiary effects.

E. Observations about the instruction, research, and extension or community outreach functions in relation to environmental problems:
   1. As one reviews the instructional side of higher education, one sees great student dissatisfaction during the last five years. This dissatisfaction has had many causes. Two central criticisms have been: (a) insufficient relevance of the curriculum to the social crises of the day, and (b) inadequate involvement of the student in the possible solution of those social crises.
   2. Environmental problems and environmental studies provide possibilities for relevance and involvement of students, both at the graduate and undergraduate level. We proved this in our creation and operation of The University of Wisconsin—Green Bay. There are other excellent examples.

3. One can organize instruction, as well as research and extension efforts, around specific environmental problem areas. Further, the three functions—instruction, research, and extension or community outreach—can be interrelated effectively to attack specific environmental problems. Each function can benefit from the union.
4. Instructional efforts for students can be enhanced if enriched by the field or "real world" experiences from research and extension. Research, in turn, can be enhanced if challenged by the concepts from the instructional process and if made more relevant because of related extension experiences and needs. Extension can be enhanced if armed with more relevant research results and if aided by responsible and informed student assistance. Students can make very meaningful contributions to research and to extension or community outreach efforts if properly supervised.
5. In short, there are real complementarities or synergistic effects from planning and conducting research, extension, and instructional efforts together. Also, the problem focus greatly facilitates the appropriate involvement of more than one discipline.
6. In such a setting, students and faculty can become more knowledgeable of (1) interrelated and multidisciplinary nature of problems; (2) real-world complexity of problem, societal interests, and possible remedial efforts; (3) possible professional contributions of others; (4) relevance and applicability of concepts of multiple feasibility and other key concepts.

F. Some new approaches to integration of instruction, research, and extension around environmental problems:
1. Environmental demonstration projects provide some exciting possibilities. The possibilities are rich. Further, you don't need to own the demonstration site or facility to use it. Examples include waste management or recycling facility, a lake improvement project, a shoreland restoration, project preserving a unique forest eco-system, etc.
2. Environmental modeling efforts provide possibilities for interaction of instruction, research, and extension. Environmental modeling can be used to explore and show the interrelationships that exist between different segments of an environmental setting. Further, it can be particularly useful in showing different levels of quality attainment at different cost levels. It can be extremely useful in exploring and demonstrating impacts of alternative actions. (Note environmental modeling efforts and environmental demonstration projects can be used on the same problem, each benefiting from the other.)
3. Many other possibilities for focusing on environmental problem analysis and problem solution. Includes University leadership or involvement in (1) environmental data information systems for decision makers and other users, (2) university, industry, and government task forces or experience teams, (3) middle-management and executive seminars on identification and measurement of various environmental impacts, (4) assistance to public agencies and groups in designing environmental impact studies.

G. Some new or improved organizational forms within and between universities or colleges directly relevant to environmental efforts:
1. Too often, we have overlooked new roles for existing administrative units and existing administrators. For example often a chairman of a disciplinary department could be given a leadership role for a multi-departmental task force in which his or her department might play a central role. A department could be given an additional mission or responsibility concerning specific environmental problems. Examples are numerous. Likewise a dean of a collegiate unit could lead a multi-college effort in which that college plays a central role. A collegiate unit can be given an additional mission or responsibility.
2. Too often we have created a new center to attack various environmental problems without seriously evaluating its likelihood of success and its crucial relationship with existing department and collegiate units. Will the center truly complement efforts on environmental problems? Are it and its overhead requirements fully justified and will it be supported adequately for its mission or task?
3. Temporary task forces provide some important possibilities for attacking problems. They can have a specific mission and focus, integrate problem-oriented analyses and extension efforts directly on key decisions. Again, I urge the consideration of possible administrative leadership of such task forces by existing unit (department) heads or chairmen.
4. College or institutional consortia are additional organizational forms that should be explored. You will find other colleges and universities involved in environmental problems of the state and of substate regions. Develop your cooperative efforts before you confront them at the problem site.
5. There are other organizational forms. We can explore these and other matters I have suggested in my framework in the discussion period.

Creatively and Realistically Relating Programs and Resources to Environmental Problems

H. G. Geyer, D.V.M., Director of Natural Resources and Environmental Improvement, Extension Service, U. S. Department of Agriculture, Washington, D.C.

Most of us now realize that nature's resources must be used with more discretion than they have in the past if man is to survive. The earth's resources are finite; there are only so many cubic feet of air, so many gallons of water, and so many acres of land. On these, all life is dependent; they cannot be manufactured.

Prehistoric man was wholly dependent on nature, continuously influenced by the processes of selection and survival. History of the great civilizations indicates their downfall stemmed from both failure to recognize environmental dangers and failure to act in a manner to forestall them.

Modern man, despite his knowledge of science and technology, has all too frequently applied it in ignorance of or without consideration for the long term implications. Future planning of environmental programs must take into account two basic parameters:

1. Recognition of the interdependence between man and his environment, and

2. Man as an ecological dominant in effecting environmental change.

Within these parameters, program planning must take into account:

1. The inseparability of man, his culture, and the natural environment;

2. The recognition that this interrelationship constitutes a system subject to alteration by man's technology;

3. An understanding and appreciation of the natural and manmade environment; and

4. Individual and group attitudes regarding commitment to overall environmental improvement.

If we are to be creative and realistic in our educational attempts, we must start with the development of an environmental ethic within the individual. Such education must be interdisciplinary, having as its conceptual base the science of ecology. If programs are to be realistic and effective, they must be acceptable. Acceptability is influenced by attitudes and personal values formed in part by social and economic experiences. More importantly, however, is the achievement of an environmental literacy which will enable us to overcome those obstacles which emanate from self-centered, social, economic, and political attitudes.

Because of the interrelatedness of the total environment, both education and programing can be structured around a variety of systems such as the Ecological Nature of Man, Human Beliefs and Myths, Conservation, Population Dynamics, Community Systems, Air Pollution, Food and Drug Abuses, Cropping Systems, and the Energy System. There are many more, but the Energy System will suffice as an example.

1. Solar Radiation—the source of all energy
   a. Availability by geographic area
      Adequacy, surplus, or deficit
      Energy transfer systems
   b. Disrupting factors to receipt or distribution
      Physical characteristics of atmosphere
      "greenhouse effect"
2. Energy Flow—the food chains
      Producers: terrestrial and aquatic
      Productivity: geographically related
      Consumers: primary, secondary, tertiary
      Ecological pyramid
      Converters
3. Disruptive or Degradative Consequences
      Natural: volcanoes, forest fires, floods
      Manmade: use of fossil fuel, waste disposal
      Effects: socio-economic
4. Alternative Sources and Wise Use
      Conversion efficacy
      Recycling
      Other sources: sun, nuclear, other

Man is steadily expanding his numbers, and his aggregating exploitive and consumptive life styles have resulted in an ever increasing accumulation of wastes that threaten his survival. Only man has the capability to alter his explosive growth and exploitation of his resources. This capability must be attuned to the reality that everything we do has environmental-ecological consequences. Only through understanding of these consequences and appreciation of the diversity of interrelationships will we be able to develop programs that will bring about a reversal of the current negative actions.

The Role of the Institute of Agriculture in the University's Environmental Response

Richard D. Schein, Director, Office of
Environmental Quality Programs,
Pennsylvania State University

I want somehow to relate to you ideas that I have on the following subjects which I will state as questions:

What is the proper attitude of a university as it becomes more engaged in the environmental education, research, and public service?

What can be gained from coordination and cooperation?

Do colleges of agriculture have a special relationship or position? Are there areas where they can move quickly?

What are some of the foreseeable snares, delusions, and dangers? How might they be handled?

The big question facing society in regard to the environment seems to me to be: how can we cleanse and then manage the environment consistent with national and human goals of a better life for a greater proportion of the people without destroying the life-support system?

I feel a great need for us to plan, to think well ahead, to develop rational policy and then to proceed in correction and development in a stately and sensible way and to leave behind, as quickly as possible, this era of rushing madly to correct past mistakes with little heed to how we compromise our futures.

To reach this rational condition demands increased education, research, and public service. It is my contention that universities are perhaps the only institutions in society to carry out these functions with that degree of disinterest and third party credibility necessary for the gradual development of rational action. Universities must not be action agencies.

To serve these functions, universities will have to continue to change and to evolve new mechanisms of cooperation—within themselves and in society. Some of these mechanisms, perhaps all we need, already are in existence. Sometime during this short course we should discuss:

1. The research institute or at least the multidisciplinary research team approach.

2. The inter-college graduate and undergraduate program.

3. The centralization of coordination within the university, and

4. The university consortium as a cooperative technique.

How does this Institute respond, efficiently and effectively, to a constituency's environmental needs?

My first point: Truth in environmental matters—in research, instruction, or public service—demands perspective. Parochialism within a great and capable university may lead not only to very imperfect study and education, but allow action or lack of action in environmental matters that will have long-term ill-effects. An example: Ecologists and other biologists have for a long time known of food chains, of energy flow in ecosystems, of the concentrations of materials as they pass through the levels of an ecosystem. The principles are taught to lower division undergraduates. In agriculture we have centered on food and fiber production, marketing, distribution and storage, and because of our successes, have become proud and politically important. The history of development of this great state cannot be separated from the work and accomplishment of its agricultural experiment station.

But we have failed to explain to students that every thing we do in agriculture is a manipulation, an unbalancing of the ecosystem. And, we trained two generations of agricultural scientists in this myopic viewpoint.

A myopic attack on environmental problems, any ecologically based problem (which means any agricultural problem), can lead only to short-sighted "solutions" and action. Increasingly, we are having to face the second-generation problems of our great and touted actions.

Witness the DDT and 2,4-D controversies. We have a full scale epidemic of gypsy moth going in Pennsylvania. There will be a million acres defoliated next year. We don't know how to act. DDT will save the trees and the watersheds, but we fear its long term concentration-in-the-ecosystem effects. We are wary of the fact that, in our zeal, we rushed to DDT because of its power to kill and we forgot, simply overlooked, the fact that it kills all (or almost) insects, (which are part of the balancing act in an ecosystem), that it affects the nervous systems of birds, mammals, and fish. Having developed a super-killer, we liked it so much for so long that we didn't go on at sufficient rate to develop more selective control methods. Now we have "Sevin"which is much less persistent but we don't know its long term effects. And biological control is in its infant stages.

Our agricultural parochialism has discredited us in the eyes of many. We are often viewed by state legislators with suspicion—as a part of a vested interest group—agriculture—and not as scholars capable of rendering further service to all society. Society has little idea how much agriculture has contributed, and has yet to contribute, to affairs not entirely agricultural.

Now, I have opened wounds you hoped were healing, so let me move to the positive.

That agriculture for years ignored the fact that its work was mainly ecological does not alter the basic situation. More ecology has been done in agriculture than in any other field. Agricultural scientists do have tremendous ecological knowledge and abilities, and more and more they want to put these to work. Thus the question is how do we organize?

First we must look at environmental problems and analyze their components.

Environmental problems arise like this: Ecosystems naturally balance themselves (the old balance of nature idea). All this is, is an equilibration of energy flow. Witness the CO_2, and nitrogen cycles. Except temporarily, no species population can grow too large because it will run out of energy to support itself. When man, a thinking animal, encountered this limitation on himself and his comfort, he invented agriculture. He began to manipulate (manage) parts of the ecosystem to increase the energy flow to him. As long as it worked out economically he concentrated only on that end—more abundant and cheap food and fiber. He showed little concern for the fact that all of those manipulations were of a natural system that must continually recycle. To pull more energy off at the top of the ecologic energy triangle demands putting more energy into it somehow, somewhere. We did this with labor, fertilizers, plowing, weeding, etc. In some of our best-managed agriculture we have more wastes left over after harvest than natural ecosystems produce annually. And we have nowhere to put that waste but

back into the system. Along the way, our marketing and distribution systems concentrate these leftovers as e.g. animal wastes in feedlots, agricultural processing wastes, etc., and great agricultural production has allowed concentration of people in cities and these two concentrate waste in small areas.

Now these wastes, too, are energy and when we dispose of them we further disturb the ecosystem by putting into it more energy at a rate faster than normal. This disturbs even more the natural systems of the biosphere and bit by bit we alter those systems. The danger is that if we go too far, too fast, we can indeed destroy these life support systems, and without them all will wither away.

Likewise, man's quest for comfort has produced industry, which, too, uses huge amounts of energy inefficiently and must get rid of its wastes (also energy) into the ecosystem where they have the same insidious effects.

From these activities, man supports on this globe populations of himself far in excess of "normal" or natural. And today his population grows so fast that, on a global scale, he is outstripping his ability to produce food and simultaneously he is poisoning the life-support system.

All this means that environmental problems arise from man's quest for comfort and that quest is rooted in the histroy, philosophy, religion, and behavior of man, in short, in his culture.

As we grow food and produce goods, as we transform energy and use it, we affect the soils, streams, lakes, oceans, the groundwater, and the atmosphere. In step, we affect the natural living ecosystems that must cycle in a balanced way to support all life. And, in step, we affect people.

We have developed economic systems—marketing, distribution, storage, etc., systems—to maintain the flow of energy and its concomitant comfort. Therefore, all environmental problems, in their full consideration have all these components: biological, physical, technological, and social. (Figure 1.)

We have a tendency to be chauvinstic about our behemoth universities, equating size with quality. We know this is folly. Oh, indeed, higher education has been made available to numbers and proportions of our population unthinkable even 30 years ago. But as our institutions have grown, integration has been lost. The science and education faculties squabble over fancied intrinsic rights to teach certain subjects. Cooperation comes largely by coercion. The ag faculty and the humanists hardly mix (here you have them on different campuses). Biology, which grew great in America because the new land grant colleges of the 19th century needed it and thus fostered it, now finds itself in liberal arts, science, or separate schools. In short, our big universities have lost integration of fields and people, and specialists move largely among similar specialists.

But the big land grant multiversity is viable, as Clark Kerr pointed out. But Kerr was not sure why. He marvelled at its ability to respond, absorb, survive. Well, Kerr is not a biologist and I am and I can say that the multiversity survives for the same reason that an ecosystem with genetic diversity survives, because in its totality it is a whole, an integration, carrying within it potential responses, whose uses and success cannot be known until tested. Diversity yields flexibility and removes the threat of extinction posed by the overspecialized being unable to respond to a change in environment.

Now, along comes the transcendental environmental crisis. Everything is in the environment, so everybody is affected. And society once again turns to the learned for solutions. It is the great and diverse institutions, like Minnesota, that have all of those components—the economic, social, behavioral, biological, technological and physical sciences—necessary to propose real solutions.

Now then, how do we go about it? I reject almost categorically the Steinhart report of two years ago which said that the only way that the universities could respond to the environmental crisis would be to create new and special schools of environmental sciences. No one with any real savvy about how universities work could make such a suggestion except in exceptional circumstances. To staff the new school of environmental sciences, the university administration would have to strip from its existing units a large proportion of the people involved in environmental teaching, research and public service, leaving the older units without a great deal of their necessary manpower. Certainly, in the politics of the university, the older units would have to be dragged screaming to the guillotine for this beheading. Alternatively, the administration would have to provide new monies for the staffing of such a new school. Because of limited funds it could not staff as fully as required and to the extent it did staff it would probably provide redundant personnel, duplicating expertise already available.

Likewise, I do not think that any single section of the university, even such a unit as your Institute of Agriculture, which for reasons I have already pointed out, has within it an immense amount of environmental knowledge and ability, should attempt to be the sole or principal environmental component of the university. And this is for the simple reason that, in line with my previous statements, you do not have all of the components which must be brought to bear on an environmental problem. To attempt to handle it yourselves, parochially within the university, would be to ignore the existence of important people with important knowledge in other parts of the university. I cannot say strongly enough that this must be guarded against.

What I have continually proposed is that the university should create a new coordinative mechanism that fosters the further development of already established environmental expertise, identifies areas of potential development and encourages them, and which works continually to provide the bases for improved cooperation among separated units and disciplines of the university.

Your Institute of Agriculture has tremendous potential in the environmental area. Indeed, it is highly likely that for some problems very nearly all the expertise you need is resident within the Institute. But for instance, could the Institute of Agriculture mount a major research program aimed at developing new systems of domestic solid waste management? (Certainly you could do very well at the problem of management of agricultural solid wastes, but your state also has problems of domestic solid waste.) One of the problems that has been unearthed, as new techniques of domestic solid waste disposal have been proposed, is that the American family and particularly the American housewife, will have to change some attitudes and behavior. We really do not know whether housewives will sort garbage at home, putting aluminum cans in one bin, other cans in another, disposable bottles in a third, recyclable bottles

in a fourth, garbage in a fifth, waste paper in a sixth, etc. To determine whether this can be done and to propose solutions will demand research by people in the human behavioral sciences and in systems analysis. These you probably do not have in needed strength in the Institute of Agriculture. Nonetheless domestic solid waste research is within your competence and you should not avoid it.

Where is meteorology in this University? You will need expert advice in meteorology in almost all environmental problems. You must find a mechanism to get advice when you need it and, as a matter of fact, to have it even when you don't know that you need it.

I should hasten to add that I do not favor the super- institute which has the authority, the power, and the money to coerce the cooperation of faculty and students, no matter where they are in the university. I do not favor this technique simply because I know so well the politics and the infra-structure of universities. We cannot solve large environmental problems without intense cooperation among the components of the university and the creation of a super-institute is not the political way to get such cooperation.

What I suggest looks like this (Figure 2). Here I have depicted on the right hand side a series of lines to symbolize the various disciplinary and professional colleges extant in a university like the University of Minnesota. On the left hand side with a similar series of lines I have indicated a series of intercollege research institutes. Between these is the word coordination with three areas of coordination indicated. The first, and perhaps the most important, is the coordination and cooperation between institutes on the one hand and departments and colleges on the other. This is based upon my strong feeling that research institutes should, for the most part, be staffed on a part-time basis with faculty scholars who have bona fide appointments in departments. I similarily feel that graduate students who are doing their research within the programs of institutes should receive their degrees in the normal process through the departments.

There is also obviously a need for coordination of the work among institutes. This is particularly true in the environmental arena where some institutes as for instance, an air quality institute, would find its work almost entirely environmental whereas other institutes might find their work only partially environmental and it is quite important that they utilize each other and not overlap.

Similarily, there needs to be coordination in research and instruction among the several colleges and departments of an institution. There are at least two facets to this coordination. On the one hand, it should be made certain that a particular department or college in its programs of research or instruction receives the assistance which it needs for complete programs from other departments in other colleges. The other facet is to make certain that serious and expensive redundancies of programs in research and instruction and in public service do not develop among the several colleges of an institution.

Please note that the coordinator then, although he has his nose in a lot of people's business, puts his major attention on those problems which cannot be handled within an individual college and he works on the techniques and methods which will bring about the necessary cooperation. He also continually studies the efficacy of existing programs. He asks such questions as, "is the ecology program in the School of Biological Sciences sufficient? Would it be improved by continual input from geology, hydrology, engineering system analysis, statistics, etc.?" The answer will be "yes," and it is the coordinator's job to encourage people to leave their parishes and to fully utilize the resources of great universities.

I want to move now to a place where I think colleges of agriculture or your Institute of Agriculture can be extremely effective. Your university has more than 50 years experience in agricultural extension and in general extension. In each case you have dedicated funds, dedicated staffs, and tremendous experience and knowledge in how to conceive, develop, and operate off-campus education programs.

Already, and for some years, some of this effort has been in the environmental arena. But now we must go through a period of analysis in which we bluntly ask ourselves such questions as this, "In our agricultural extension efforts and in our continuing education or general extension efforts, are we really utilizing the expertise and resources of our university as fully as we mgiht?" If you look out across your state you'll identify many areas of environmental concern to which persons in several nonagricultural components of your university might join you. So now I encourage you to remake your extension programs, not abandoning traditional agricultural extension by any means, but trimming away the fat, the traditional, the redundant, the expensive and unneeded, and using those funds to retrain county agents and other extension personnel and to begin to hire a new breed. What I am saying in effect is that we must acknowledge that we have on our land-grant university campuses and in their states a highly developed mechanism for extending information from the experts on the campus to the people who need it and for gathering in information about problems and channeling it to the right kinds of experts on the campus. Let's use that mechanism and let's use it imaginatively.

In summary I have said this to you. Environmental problems are broad and demand perspective in the attack we make on them, whether in resident education, research, or continuing education. We must not allow parochialism as it has developed inside universities to prevent us, as universities, in doing the best job that we can to face the environmental crisis. We must reintegrate through a mechanism of transcendental cooperation. I have proposed one sketch of how we might at least start on this.

There will be problems whenever we talk about intercollege cooperation. Who gets the credit for students taught or degrees granted? There will be problems of whether or not Professor X gets rewarded in salarly and promotion if he devotes a significant portion of his time to inter- rather than intra-college efforts. We have to be bigger than our established parishes. And I would welcome an opportunity to discuss more concretely with you some of these problems which I have raised.

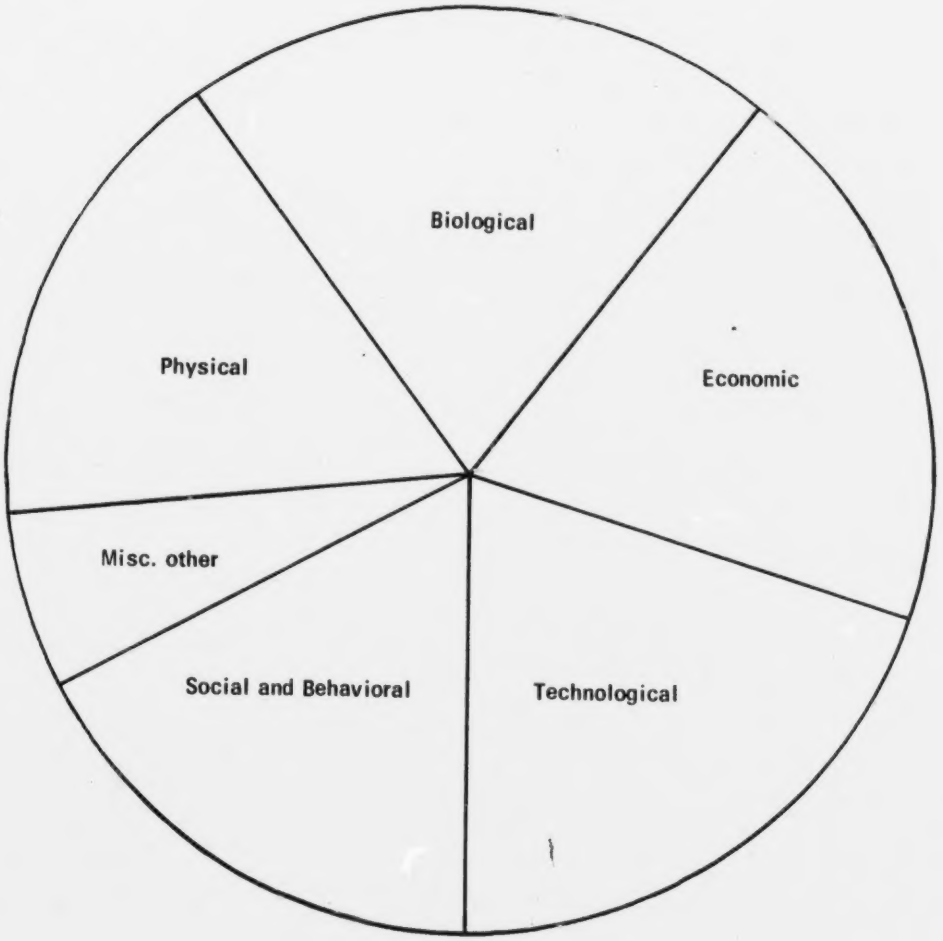

Figure 1. Components of an environmental problem

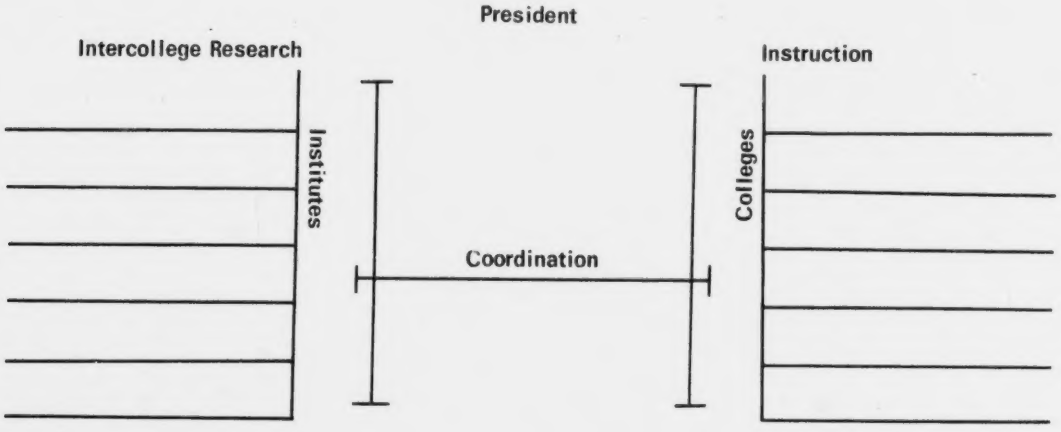

Figure 2.

Environmental Issues and Conflicts Generated by our Energy Using Technology

Dean Abrahamson, Director, Center for Studies of the Physical Environment, Institute of Technology, University of Minnesota

Over the past several years there has been increasing concern, by all segments of the society, for environmental and social matters. These concerns have been manifest in many ways, including public demonstrations, actions involving the executive, legislative and judicial branches of government at all levels, and studies both scholarly and otherwise. In Minnesota, issues coupling the meeting of energy needs and environmental considerations have been predominant; this situation is not atypical. We have seen public and governmental concerns with transmission lines, fossil-fueled power plants, nuclear-fueled power plants, and, in Wisconsin, with hydroelectric projects.

The heavy emphasis on the interaction of meeting energy demands with preservation and enhancement of environmental quality is now being focused in the national debate which has begun on an energy and fuels policy. President Nixon's energy message to the Congress of June 1971 and the major Congressional energy study authorized by Senate Resolution 45 stand as evidence of the seriousness of the problems with which we are faced.

In addition to the efforts aimed at a National Energy Policy, several states are debating an energy policy. The interest in such a policy for Minnesota has been indicated by the response to the Twin City Urban Corps study, Overconsumption of Energy: A Minnesota Crisis, which was released on August 26, 1971.

In the past, controversies over energy related facilities, such as the Allen King Generating Plant on Lake St. Croix, have focused on the location of a specific facility or in the case of the Monticello Nuclear Plant on the specific operating conditions which would be imposed on a specific plant. It is now being recognized that while the concern over siting or operating practice is important it is also important to consider broader aspects of the problem. These broader aspects include environmental and social effects associated with all phases of the fuel cycle (such as strip mining in the case of coal fired plants or disposal of radioactive wastes in the case of nuclear plants).

It is also of paramount importance to consider very carefully the question of power demand versus power needs. It is no longer possible to accept as adequate a statement such as, "electric power demands are doubling each nine years" as justification for the construction of additional facilities.

It would seem that a rational approach to the energy problem would be first to determine the use to which energy is being put at present, to then determine the growth rate for each substantial energy use, to assess the implications of these energy consumption patterns (and the implications of changes to these patterns), and then and only then to entertain the construction and operation of additional power production facilities.

During the past two or three years there has been a rapid expansion of the literature regarding the environmental and social costs associated with energy production and with various other aspects of the energy field having national or international implications (such as reserves of fuel or global effects of various pollutants arising from the consumption of that fuel). There has been relatively little attention given to the utilization of energy and the implications associated with this utilization or perturbations in the utilization patterns. This should not come as a surprise as most of the studies have been done either by or under the sponsorship of institutions which have not traditionally questioned growth. Essentially all past and current energy studies assume that the growth rates of the past will be maintained at least during the next several decades.

As a consequence, there is relatively little available data on details of the energy consumption patterns, and to my knowledge no such data (except as might exist in the files of local utilities) available for consumption in Minnesota or the Upper Midwest.

What is needed is a comprehensive survey of energy use in Minnesota (and perhaps the surrounding region) or in the areas served by Minnesota-based utilities (NSP, Minnesota Power and Light, Ottertail Power, and others). This should include all fuel and energy use but the emphasis should be on electrical power use and uses (such as urban transportation or space heating) that may become electrified in the near future. The survey should also include a tabulation of new energy using industries or activities planned for Minnesota.

Environmental Issues and Conflicts Generated by Our Socio-Economic Goals and Priorities

Willard W. Cochrane, Professor, Department of Agricultural and Applied Economics, University of Minnesota

Since the founding of this nation, one dominant socio-economic goal has been, "the opportunity for each individual to improve his material well-being through initiative and effort in an essentially free enterprise system."

Where the initiative and effort of one individual has operated to harm other individuals, we have commonly taken action to regulate and control the first individual.

But our socio-economic goal has been a maximum of free, individualistic enterprise as a means of: (1) providing a good way of life, and (2) a high material level of living for all members of society.

The pursuit of this general goal has produced generally desirable results, although in our complex 20th century society it has become increasingly compromised.

In the pursuit of this goal, we have been little concerned with the disposal of residuals, or wastes, of individual enterprise activities.

We have simply assumed (except in the special case of certain urban areas) that areas of non-private property, e.g., the atmosphere, the ocean, rivers and land, were of sufficient magnitude to absorb the residuals of private enterprise without damage to society or the environment.

And, so long as population densities were low and resource using and conversion activities were minor relative to the total eco-system, a general behavior pattern based on this assumption worked reasonably well.

But, we have reached a state where residuals, or wastes, of the population and resource using and conversion enterprise activities of U.S. society can no longer be absorbed easily and readily by the unappropriated physical spaces.

Thus, the goal of free, individualistic enterprise, in conjunction with a policy of disposing of wastes in unappropriated physical space, is coming into conflict with certain other socio-economic goals, such goals include: (1) good health for all, (2) outdoor recreation, (3) aesthetic values, and (4) survival of certain species, including, perhaps, man.

Consequently, pressures are building up in our society to take action to achieve some or all of the above social goals, even though it means infringing upon the older free enterprise creed, or goal. And it is in connection with the achievement of these latter goals that we are beginning to encounter some serious goal conflict in the agricultural sector.

Let us consider the case of water in our streams, rivers, and lakes as it relates to the goals of good health, outdoor recreation and aesthetics on one hand, and the agricultural enterprise on the other.

It is clear to me, from the reading that I have done in connection with this talk, that land runoff carrying fertilizer residues and soil particles has become the major pollutant of streams, rivers, and lakes in rural areas.

One can argue the relative importance of fertilizer nutrients and eroded soil as pollutants. But fertilizer nutrients must have increased greatly in relative importance in the past two decades. And, any further application of fertilizer means further nutrient enrichment of streams, rivers, and lakes from land runoff, hence, increased eutrophication of the waters involved.

Thus, it follows for me that researchers in the agricultural sciences should stop closing their eyes to the facts of land runoff pollution, or arguing that facts are not really facts, or arguing that someone else in the total eco-system is a bigger pollutant than the farm enterprises, and recognize that land runoff pollution resulting from erosion and fertilizer application is impairing the achievement of certain social goals (i.e., good health, aesthetics, recreation): (1) In some cases, seriously and (2) In other cases, only modestly as yet.

Further, as agricultural leaders, we must understand ourselves, and help both farm and nonfarm citizens understand that:

1. Our current high agricultural productivity is dependent upon: a. intensive cultural practices and b. including the use of chemical fertilizers.
2. We cannot return to the farming practices of our forefathers, and maintain the present world population, or even perhaps the present U.S. population. Some of us would starve.
3. The solution to the problem does not involve giving up science. It means using science to produce the present volume of agricultural products (and incidentally, maintain the rate of increase) and not pollute the environment.
4. It means using science not to discover least-cost production combinations where the disposal of residuals are ignored, but rather using science to discover production methods that are compatible (or at least tolerable to) with the various and often conflicting goals of society. C. R. Frink stated the proposition nicely in a recent issue of Agricultural Science Review* when he wrote: " . . . as a final comment, I would like to suggest that we abandon our preoccupation with obtaining the maximum yield per acre and consider instead systems analysis of agricultural practices that will maximize all** benefits to society . . ."

If an agricultural research station is to be responsive to the changing needs and goals of society in the 1970's:

1. It will, as a minimum, want to reorder its research priorities so as to develop practices and technologies that reduce the pollutant effects of farm production. Research for example: (a) On methods of fertilizer application which reduce the nutrient runoff. (b) On plants and crops and crop combination which require lower applications of fertilizer. (c) On combating soil erosion.
2. As a maximum, it will want to initiate multidisciplinary studies leading to new farming systems which maximize the achievement of several important goals of society in this general area. (a) Effective multidisciplinary studies are not easy to conceptualize and to carry off. (b) But such studies will be required to get action on a broad front of productive activities concerned with multiple, and often conflicting, social goals.

*Second Quarter 1971, Vol. 9, No. 2, page 24.

**Underscoring mine

Research is one thing, getting a new practice, or farming system adopted is another. Thus, I should like to talk briefly about how we go about getting production practices which do not pollute the environment adopted on farms—particularly where they have the effect of increasing production costs.

The promulgation of a regulation banning a practice, or requiring a practice, has been our traditional approach to pollution problems.

In dramatic cases—unique cases—or where policing was relatively easy, this approach has worked reasonably well. But in the less dramatic, ubiquitous case where policing is difficult, regulation has not proved successful. And pollution in agriculture more nearly fits the latter case than it does the former.

It seems to me then, that we must depend upon a system of incentives (positive or negative) to induce on a broad scale, production practices which minimize the pollution effects of agricultural production. If a farmer is to adopt some small practice, not easily policed, but which in the aggregate becomes important, it must be to his advantage to do so. And certainly he won't change his whole farming system, unless it is to his advantage to do so.

I don't at this time, have a full system of incentives to suggest to you, but I can offer three illustrations:

1. The case of ACP payments to induce farmers to distribute animal wastes on nonfrozen land.

2. Making commercial fertilizers dearer through taxation, to force farmers to use it more economically. (a) In addition, it would contribute to supply management, and, (b) Applied on a national basis would not hurt any individual farmer.

3. Production payments under the various commodity programs could be made conditional upon the adoption of production practices which minimize the pollution of the environment.

Taking action to minimize the pollution problem in our society may require some institutional innovations.*

The modern pollution problem results largely from large and small private enterprises disposing of their wastes in unappropriated physical spaces that belong to all of us (e.g., Mississippi River) as if such spaces were limitless and free.

No pollution problem came into being so long as such spaces were limitless relative to the volume of residuals deposited in such spaces.

But, being free, these spaces were used more and more, until the volume of residuals could no longer be absorbed into those spaces without damaging consequences—or without polluting effects.

These unappropriated spaces belonging to all of us, because of their now limited availability had, in fact, become valuable pieces of property, but society continued to treat them as a free good.

So they have been overused—creating a pollution problem for all of us.

It now seems logical that society recognizes that it owns some valuable space (e.g., streams, rivers, lakes, atmosphere, oceans, ground water) and formally take possession of that valuable space.

I am suggesting that society: (a) formally take possession of heretofore unappropriated space. (b) establish corporate entities to regulate the use of such space. (c) and where appropriate, charge individuals for using that space (e.g., charge both private and public enterprises to dispose of their wastes in such spaces). Charging enterprises to dispose of wastes in such spaces would force them to economize in the use of such space, hence, reduce the pollution effects.

Let me develop this idea with the aid of several illustrations.

1. Car owners might be taxed by "The Atmosphere Authority of the USA" by the volume and quality of the car waste emmissions.

2. Manufacturing firms disposing of wastes into the Mississippi River might be charged a fixed rate per gallon or pound of residual, depending upon the qualities of the material.

3. Farmers might be charged a runoff rate per acre by a "Small Watershed Authority" depending upon: (a) the method and rate of fertilizer application, (b) cropping system followed, (c) average slope of the tilled land.

What I am suggesting here is an institutional development in which: (a) the value of space owned by society in common is recognized, (b) that such valuable property be managed by public authority for the benefit of all, and (c) that management would involve users of the common property paying for the use made of it in accordance with the depreciation resulting from that use.

To me this is a completely reasonable institutional development—about 100 years overdue.

In summary, I have argued that research workers in Agricultural Experiment Stations can no longer assume, in the employment of their scarce resources, that there is one dominant over-riding goal in agriculture, namely, the achievement by each farm enterprise of a least-cost production organization, where the disposal of residuals is ignored.

The persistent pursuit of this goal is creating goal conflicts in our society. The monistic pursuit of this goal conflicts with the achievement of: (a) good health, (b) outdoor recreation, (c) aesthetic values, and (d) the survival of certain species, including, perhaps, man.

Research in agricultural experiment stations must take into account the multiplicity and the changing goals of society, including those outlined above.

Scholars and administrators who pioneer research work leading to a joint maximization of multiple social goals will be the Nobel prize winners of the future.

Those that are unwilling to seek out the new problems and find solutions to those problems will find promotion, salary rewards, and honors escaping them.

Finally, I have tried to open some new horizons in the institutional area. Old-fashioned land economists and new fangled resource economists should have a barrel of fun working on the institutionalization of heretofore unappropriated space.

I am tempted to enter the arena myself.

*I am indebted to Vernon Ruttan for the basic ideas developed in this section.

Our Production-Consumption Goals and Processes

A. C. Hodson, Head, Department of Entomology, Fisheries, and Wildlife, University of Minesota

At the present time and for the foreseeable future hard choices will have to be made to reconcile differences among those who must ensure sufficient food and fiber production, those concerned with land management, and those who are dedicated to the maintenance of environmental quality, and if you will, the quality of life. All of these responsibilities and concerns are the warp and woof of the instructional and research commitments entrusted to the staff and students in the Institute of Agriculture. As everyone knows, the weaving process is frequently interrupted or even abandoned because of breaks or knots or change in pattern or design. So it is in our attempts to fulfill the Institute's missions suggested above. Conflicts of interest do arise and production methods have to be revised or sometimes abandoned. A few examples will suffice to illustrate these points.

The choice and use of various pesticides, acknowledged as essential elements of agricultural technology, have created conflict between those attempting to manage plant and insect pests and those concerned with the hazards they sometimes present, particularly some unforeseen harmful effects on ecosystems. The resolution of this problem has been complicated further by the substitution of less persistent materials for the so-called hard pesticides, which in turn have some even more undesirable properties. We are and should be deeply involved in seeking a way out of this dilemma. We explore new approaches and often, to paraphrase William Shakespeare, to spray or not to spray, that is the question.

The advocates of multiple use of lands such as those in our national and state forests and in agricultural areas have to be willing to accept the fact that each acre cannot serve all the purposes desired. Current studies on big game and ruffed grouse offer examples where judgment values come into play. Moose and deer cannot be supported on small acreage. Their needs for food and shelter also call for forests mixed by both age and tree species which are not met with pure plantings of conifers or by the preservation of extensive areas of mature forests. Management plans to accommodate the needs for wood production have to be meshed with wildlife management plans to permit desirable multiple use of forest areas, and thereby ensure a supply of fiber while providing recreational opportunities. The extensive occurrance of overstory conifers also presents hazards to the ruffed grouse. They not only do not provide food but also reduce ground snow cover essential for winter survival and provide roosting sites for their most important avian predators. There is a bright side to the forestry-wildlife story because the research on ruffed grouse suggests that the proper harvesting of the ubiquitous aspen may have a very beneficial effect on grouse populations.

The Lake of the Woods and the border agricultural area to the west have presented two knotty problems which serve further to illustrate the kinds of dilemmas we create for ourselves and have to resolve. Over the past several years the production of bluegrass seed has exploded in the northwest counties. As is commonly the case, the establishment of a large monoculture is accompanied by the threat of losses from insect damage. A recent investigation carried on with the cooperation of agronomists and entomologists has shown that burning the bluegrass fields soon after harvest practically eliminates the two most important insect pests, and at the same time creates other conditions which greatly favor subsequent increased seed yields. However, this burning success is not without its problems. There is the chance of undesirable air pollution and hazards to highway driving created by the smoke which could mitigate against this practice. Should it be banned by the agency responsible for air pollution control we would find it necessary to recommend insecticide for insect control and other different agronomic practices.

The Lake of the Woods story involves a genuine conflict of interest with regard to the use of the lake for sport fishing and commercial fishing, with mink farming more than just an interested bystander. There were other economic considerations but in 1967 the Minnesota legislature created the Lake of the Woods-Rainy Lake Commission which had as one of its prime objectives the resolution of the fishing practices controversy. Because of the involvement of the mink industry at least three of the Institute's missions, fiber production, food production, and recreation were included in the subsequent investigations in which the Institute of Agriculture participated. The Commission's report submitted to the 1971 legislative session suggests that the lake can support both sport and commercial fishing although more stringent regulations may be necessary if both are to prosper. The most important feature of this venture is that a modified "Marshall Plan" was adopted with personnel of the Institute contributing research results which then would serve as a basis for decisions and value judgments to be made by the legislature, the Department of Natural Resources, and the local people.

These few examples of environmental issues and conflicts, which can arise in our attempt to meet some of our production goals, show the extent to which technological and economic considerations, and value judgment are involved. Our posture has been and should continue to be to provide our constituents with the best technical, economic, and social information possible. We also should anticipate the need to be willing to step into controversial issues with the object of shedding light on subjects which too often receive more heat than light.

To provide the light it will be necessary in many cases to encourage the conception of new approaches to old and new problems. One such case is the controversy that is evolving with the promotion of nature foods and organic gardening. Those who disclaim the statements of their supporters have the obligation to design and follow through on experimentation which will be enlightening and not just support a favored position. It is encouraging to note that such a project is to be proposed and is likely to have the support of staff representing several disciplines. This is the way we have to go if we are to avoid too many more unforeseen undesirable consequences of our endeavors.

Group Discussion: Group 1 Institute and the Environment

Chairman: Herbert W. Johnson, Department of Agronomy and Plant Genetics
Recorder: John J. Waelti, Department of Agricultural and Applied Economics

The group attempted to follow closely the suggested guidelines for discussion. The interpretation of the major points made by the speakers on September 16 is as follows:

The Institute of Agriculture does not have the resources or the expertise to cover all aspects of the environment.

It is, however, uniquely endowed to make a significant contribution in teaching, research, and extension relating to many areas of the environment.

The people of the Institute were urged to be aware of environmental work done elsewhere in the University and other educational institutions.

The 2nd and 3rd order effects of technological innovations are extremely important. By observing the total results of existing experiments in progress, we might get insights regarding environmental regressions.

The base of the ecological pyramid, food and feed, is where the accumulation of new energy occurs, indicating a continuing need for effort on production.

Tradeoffs are central to the environment controversy. With our present level of population, we cannot have a "perfect" natural environment. Yet, we could be doing better than we are now.

The Institute of Agriculture should include the environment in its many aspects - biological, physical, cultural, aesthetic, etc.

Total effort depends mainly on financial support. The Institute may for some time have to rely largely on "soft money" (nonrecurring type funds).

Effort should include long range "preventive pollution" as well as short range "band aid" or corrective action.

No unit within the University should attempt to be the environmental unit, but should concentrate on areas where they have a comparative advantage, and should draw on outside resources where necessary.

There was disagreement on the organizational structure under which environmental effort can best occur. Some favored intercollege institutes. Others favored the existing structure with greater effort across disciplinary lines. The cost of energy per dollar of GNP is rising. The use of energy on an absolute basis is rising rapidly.

Energy input and output in agriculture are approximately in balance. However, effort should be directed toward increasing the ratio of output to input.

Regarding the directions the Institute of Agriculture should be moving in the future, the general consensus of the group was as follows:

The Institute of Agriculture has expertise in certain areas and might best concentrate on those areas. However, this does not preclude considering the environment in its broadest context, including cultural and aesthetic aspects. In general, preventive solutions should be emphasized, as well as corrective solutions. For example, insofar as human population has a bearing on the environment, current research expertise heretofore untapped may be significant. Research on animal fertility may have aspects relative to human fertility or fertility control, for example. This doesn't mean that animal scientists suddenly switch their emphasis. However, perhaps the research of animal scientists can be put to broader use, or may have profound implications on problems quite removed from its initial intended purpose.

The past research emphasis has been disproportionately focused on relationships such as land-livestock, plant-land, plant-livestock, etc. There is ample room for more focus on the human factor, i.e., man-land, man-plant, etc. Home economics is uniquely equipped to put effort on problems involving man, housing, children, and aesthetic interrelationships.

The group agreed that the processes and procedures for stressing priorities in environmental areas will and should probably be no different than priorities in other areas, being determined primarily by faculty support, interest, expertise, and resources made available.

The group believed that the organizational framework for carrying out research and extension responsibilities is generally adequate, and the Institute has had long experience in handling interdisciplinary problems. However, some innovations for teaching may be in order. Specifically, the Institute of Agriculture should take initiative in initiating a University committee to identify areas, courses, and possibly curricula of an environmental nature. An interchange of teachers across college and institute lines would be healthy. The Institute of Agriculture has many areas of expertise of which other units in the University should be aware. There is also the possibility of requiring a minimum number of credits in the environmental area.

It was agreed that the Institute should work with agencies in providing a data base and other assistance which they might utilize as a basis for policy. However, it was strongly urged that the Institute have no part in any regulatory activity. The Institute should provide data and assistance to clientele of the agency as well as to the agency itself. It was recommended that deans and directors take initiative in informing agencies of relevant areas of competence in the Institute.

There currently seems to be little relationship with other units outside the University regarding work in the environmental area. The dilemma is to have more coordination, but to avoid additional administrative structures. It was recommended that deans and directors take initiative to contact other institutions and offer to discuss common problems and information exchange.

Group Discussion: Group 2 Institute and the Environment

Chairman: Richard A. Skok, College of Forestry
Recorder: Evelyn P. Quesenberry, Agricultural Extension Service

What did the speakers tell us yesterday about creatively and realistically relating collegiate programs and resources to environmental issues?

DISCUSSION: It is pretty tough to do this on our own; a complete, interdisciplinary university effort is needed. We need multi - disciplinary rather than interdisciplinary effort. Individuals don't all have to be interdisciplinarians.

Someone tried to clarify the difference between multi and interdisciplinary as follows, "A person may be an interdisciplinarian, but multi disciplinary means expertise of various units."

We must consider individual interests of people. Some work better within their own special field and get university rewards for specialization. A person who works in outside fields may take some risks. We need to redesign the reward system.

A suggestion: We might identify individuals in a department who are interested in environmental programs. They could be designated to work in the department and outside with others.

Someone disagreed with the idea that you can't work on the problem and still stay in the department.

A department head, responsible for a particular department, doesn't have the charge from the dean to work in a broader area. This should be spelled out with reward.

Might we be hiding behind the department structure, rather than reaching out beyond the department? Perhaps no one is assigned to coordinate joint effort.

Time for pulling together joint projects is limited. We have to drop something else to do coordinated projects. We need to set priorities.

Short staffing prevents some coordination. Administration needs to recognize that additional staff and resources are needed if an Environmental Center is to be established. The pooling of resources (i.e. secretarial staff as in CURA) might be done.

We need to talk to administration and say, "I'm glad to get involved, if I can be relieved of other duties."

We could integrate studies into classwork of students. Supervision of students also takes time.

QUESTION: Do you think the administration of the experiment station and extension is encouraging group research?

RESPONSE: Yes, both are encouraging this type of effort.

QUESTION: Why are we not moving this way? Is it the department head that is not moving?

RESPONSE: The main problem is time. Central administration must allocate time, money, and resources. Do these group efforts take more time and money? We may get more done with traditional methods. The quality of research may be lower in this group effort.

It may take longer to coordinate; but after coordination is achieved there may be more success.

There is an indication that more environmental research is needed. How can we minimize duplication of research between states, agencies, and other units?

There is a gap between results of research and application of results. But, someone said, "In environmental research, the gaps are shorter."

QUESTION: After research is done and findings known, how do we change practices of people to apply knowledge? How do we get people to improve the environment?

RESPONSE: (1) regulation, (2) education, (3) economics—cost of polluting.

Where should the Institute of Agriculture be moving?

DISCUSSION: Establish several sub-task forces to work on various phases of environment .

The point was again made that time needs to be available or something needs to be omitted to do the environmental work. Administrators need to help us free time for this.

Lowell Hanson discussed his proposal for an Institute Environmental Action Project (attached).

QUESTION: What about our involvement with industry? Do we have any? Should we have more? Or do we have too much?

RESPONSE: We need to be careful of involvement. Industry might get too many resources from the university. Industry involvement may interfere with university traditional programs.

There may be too much tie to commodity groups and too little to general public. For example, when you determine that less fertilizer should be used you get criticism from industry. Maybe that is a risk you take because much lobbying has been done to get research findings.

QUESTION: Does the university have an obligation to have a policy of diversity of the environment vs. making more money?

RESPONSE: Multiple goals exist now vs. single goals of the past. We need to appraise the different components, i.e. profit vs. cultural or aesthetic aspects. We need trade-offs—must give something to get something.

We must spell out the multiple goals; but goals aren't spelled out. WHO spells out goals?

A number 1 priority is to make ourselves and our resources known to other agencies, units, and industry. Then we must respond to needs as identified by citizens, i.e. PCA discussion yesterday.

The environmental area is relatively new; people are still sorting out their ideas. Perhaps we need to determine which streams to clean up--or the degree of pollution that is acceptable.

People may not know enough about the state of the environment. We need to be concerned about the levels or stages of awareness concerning environmental problems: (a) Person with little awareness or knowledge. (b) Action groups already moving. (c) Innovators—those ahead in the game—may give information to the university and receive information from it.

Someone proposed the development of a mechanism for establishing an environmental center and the securing of grants for land and resources for rural waste management.

Someone raised a question of an environmental center vs. objectives and solutions to the problems.

A question was raised about projects already underway in environmental research, i.e. the listing in the booklet distributed to seminar participants. There is a credibility gap. Are we really getting our money's worth?

We need to stress the educational aspects of our programming. We are tied to low key approaches in our traditional approach, rather than high key relevant programs.

We need to set out to do the best we can to serve the public, new clientele as well as traditional clientele.

Methodology and course content need to be improved and integrated with other units.

A suggestion was made for regular seminars on campus, perhaps once a month, to discuss environmental problems.

Proposal for an Institute Environmental Action Project

Lowell Hanson

I think it would be appropriate for the Institute to sponsor a short term task force study titled "Feasibility of Effluent Charges to Control Pollution in Minnesota." A six-month deadline would be appropriate since timelines is at this point more important than completeness.

The suggestion to consider a project on effluent charges is based on the following considerations.

1. The concept of pollution charges is basically simple but the implications are broad and not well understood. Consequently, a well planned and coordinated study of the impact of pollution charges in a representative state like Minnesota would attract national attention and could attract support from a number of sources.

2. The kind of resources available in the Institute of Agriculture are well suited to this kind of a study. We are particularly strong in fields of applied biology and resource economics.

3. The dimension, implications, uniqueness, and timeliness of the project make it likely that if the Institute of Agriculture does not take leadership, someone else will.

In order for this proposal to be a viable basis for discussion at the symposium, a small committee of two or three people should be assigned the task of writing a project proposal for distribution to Friday's participants.

Group Discussion: Group 3 Institute and the Environment

Chairman: Robert W. Touchberry, Department of Animal Science

Recorder: Landis L. Boyd, Department of Agricultural Engineering

What did the speakers tell us yesterday about creatively and realistically relating collegiate programs and resources to environmental issues? This discussion group spent much time relating to what the speakers said but without explicitly reviewing the remarks. Reflecting upon the recommendations of Vlasin and the structure suggested by Schein, it was the consensus of this group that the Institute should use existing administrative structures and not create new ones. They added that perhaps we should attempt to "awaken" administrators and faculty of needed additional emphasis on environmental issues.

There was some feeling that an additional impetus of some sort was needed between a department and the Institute. Vlasin suggested the assignment of such additional duties to department heads. The group indicated that perhaps the existing Council on Environmental Affairs could provide the needed impetus. A single coordinating individual or group may not be the best approach, because coordination may need to be different for the different functions, i.e. instruction, research, and extension.

There was concern in the group about how to relate with other segments of the University. This included the idea of cooperative effort but also the need for visibility of the things that we were doing that related to environment, i.e. recognition by others of our competencies. An example was the Limnology Center's formation by a group outside of the Institute and with virtual exclusion of anyone from the Institute? Further discussion seemed to indicate that this was almost a one-man effort, and if not that, of a small group.

The concept of group action such as exhibited in the experiment station and in extension is essentially nonexistant in other parts of the University. Many of the group were not really familiar with the experiment station and extension service 1971-73 budget request to the legislature emphasizing a sizeable number of environmental issues. After this was explained in some detail the group still felt we were lacking in the instructional area. It was suggested that perhaps the program committee could provide the needed guidance to define the direction with the existing units (departments) meeting the needs.

Where should the Institute of Agriculture be moving in terms of:

a. The types and numbers of environmental issues for which it should accept responsibility? The group reviewed the list and handout material and felt that it covered a number of the important items. It was suggested that our priorities be in our major areas of activities. We should follow through on all aspects of the problem including all levels of nondirect i.e. secondary, tertiary, etc. effects as much as possible. Whenever we find that we cannot meet the needs on our own we should join with others as soon as possible. Our efforts should be defined by function with broad coverage on instruction and extension and a lesser amount on research. We cannot research everything and can depend on some other institutions and agencies for some of our needed research information for both instruction and extension use. There was a feeling that we needed to decide whether or not we would make "value" judgments.

b. The process and procedure through which the Institute sets its priorities with regard to environmental issues? This was not covered very well with much of the discussion relating to the extent we could have rigor and still have relevance. It evolved that rigor was possible with rather narrow groups relative to background and that relevance could be included with rigor in this instance. With groups having rather diverse backgrounds rigor would have to be sacrificed to make things relevant. The concept of more total coverage was included.

c. The posture of the Institute towards regulatory functions and agencies? There was agreement that we should provide as much factual information as possible including both that which we generate through our research and scholarly activity and that which we can obtain elsewhere. There was also some feeling that we should try to interpret and evaluate the information for the agencies. This could be done largely through relating to regulatory agency clientele where there often is considerable turn-over, particularly of the leadership which often changes when there is a change of the political party in power. There was a strong feeling that we should limit considerably the diagnostic services performed for regulatory agencies. We probably need to make clear who are University sources and who are not University sources. While they are not regulatory agencies we need to be sure that out-state groups in other educational institutions, e.g. vocational-technical schools have the facts as they come in contact with a number of people and often with regulatory people, also. It seemed to be the feeling that it was appropriate for faculty to serve on study committees for state officials and state agencies.

d. The relationship and interrelationship of the Institute's environmental programs and policies with those of relevant units within and outside the University? This question was discussed after the closing time and only one comment was made: "We should assume aggressive leadership." There were no comments of disagreement.

SUMMARY

D. B. White
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The seminar focused on the Institute's role in environmental affairs; the challenges facing the Institute and the importance of its current activities and programs as they relate to the environment.

Some of the subjects discussed during the seminar are outlined below:

1. The mission of the Institute of Agriculture includes service through: (a) the protection and improvement of the quality of life, and (b) the utilization of resources to the greatest advantage while minimizing environmental deterioration.

2. Major segments of the research, teaching, and extension activities in the Institute are directly focused on environmental issues.

3. Environmental problems are real and will be with us in the future.

4. No single unit at the University has all the components and competencies necessary to solve our environmental problems.

5. Solutions to environmental problems require multi- and interdisciplinary efforts. Careful attention to definition and approach to project development will be necessary where several disciplines work together.

6. New organizational structures may be necessary. However, they should build on the strengths of existing, proven structures.

7. Reevaluation and modification of our current reward systems must be considered.

8. Traditional disciplines should examine their situation to ascertain where they fit and the kind of commitment they need to make in the area of environment.

9. Strong attention is needed to foster environmental literacy sufficient to develop an environmental ethic at all educational levels.

10. In dealing with or approaching environmental problems it should be realized that the 2nd and 3rd order effects may ultimately be the most important.

11. The Institute should be involved and concentrate on development where it has expertise and should emphasize preventative as well as corrective solutions.

12. The concept of multiple feasibility was offered as a new approach to environmental problems. This model allows for integration of environmental, economic, biological, aesthetic and other disciplinary factors.

13. More discussion of environmental issues is needed.

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